



Type MFVU 21
Digital Definite Time, Frequency Relay

ALSTOM

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Figure 1: Type MFVU 21 relay withdrawn from case



Features

- Two under or over frequency stages
- Fully independent or differential pick-up/drop-off operation
- Wide frequency setting range
- Built-in timer for each stage
- Wide operating voltage range
- Positive calibrated settings by means of switches
- Test facility

Application and Description

The type MFVU 21 digital, definite time relay consists of two fully independent frequency monitoring circuits which can be used as either under or over frequency protection. In addition, the two operating circuits can be used together to provide pick-up and drop-off at different frequencies.

The relay is suitable for any application in industrial plants and to generators where definite time under or over frequency protection is required.

In addition multi-stage schemes using several relays can be provided for load shedding and reconnection applications.

Integral timers are provided for each operating circuit and separate electromagnetic auxiliary relays ensure maximum flexibility of application.

Figures 2 and 3 are block diagrams showing relays suitable for use with ac and dc auxiliary power supply voltages respectively.

Inputs, Outputs and Indications

Three terminals are provided for the voltage input to the frequency monitoring circuits of which two are selected depending on the maximum voltage which can appear at the terminals. The voltage input connections must be either phase-to-phase or phase-to-neutral and the maximum permissible input voltage for each pair of terminals is detailed

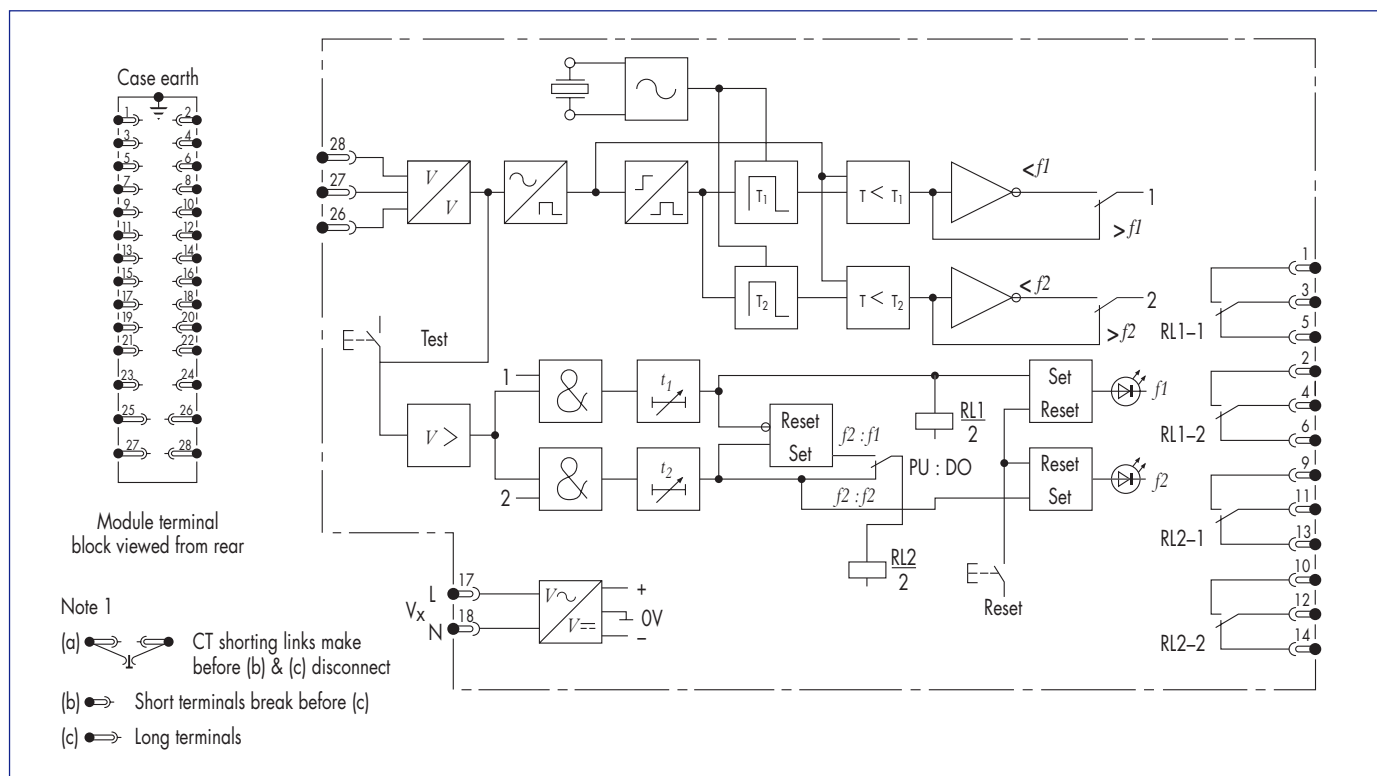


Figure 2: Type MFVU 21 relay: Block diagram, ac relay

in Figure 4. The relay can be supplied for use with either ac or dc auxiliary supply voltage.

For applications in which operation of the relay and subsequent load shedding is not desired, when the system voltage drops to a very low value, it is recommended to drive the auxiliary voltage from the same source as the measured voltage. With this method, the relay stops operating when the voltage drops below approximately 65%. When a different voltage cut-off is specified, it is recommended to use a separate undervoltage relay MVTI with the underfrequency relay MFVU 21, suitable for dc auxiliary supply voltage.

Separate electromagnetic auxiliary output relays are provided for each frequency monitoring circuit. Each output relay provided two changeover contacts.

Front plate mounted LEDs are provided to indicate the operation of each of the two monitoring circuits. These can be reset by a push-button which can be operated with the front cover of the relay in position.

Operation of the relay can be tested by means of a test push-button which energises the output relays and LEDs after the set time delays which the channels set to underfrequency operation. Access to the test push-button requires removal of the front cover. This test facility should only normally be used with the relay trip circuits isolated.

Relay Settings

The two frequency detector circuits have set frequencies defined

$$\text{by } f_1 = \frac{1}{T_1} \text{ and } f_2 = \frac{1}{T_2}$$

where T_1 and T_2 are the periods of the operation frequencies in seconds and are set by thumb-wheel switches on the relay frontplate.

In each case, T is selectable between 0.09999s and 0.00200 in steps of 0.00001s. This corresponds to a frequency setting range of 10.001 to 500Hz.

Switches are provided on the relay front plate to select and, also, to inhibit the operation of either channel.

Note: The channel on/off switch must be in the off position before attempting to alter the T setting while the relay is in service.

A further switch is provided to select either independent operation of the two channels or configuration of the two channels with f_2 as pick-up and f_1 as drop-off. In this configuration, output auxiliary relay RL2 energises at pick-up (setting f_2) and de-energises at drop-off (setting f_1). The output auxiliary relay RL1 energises and de-energises at the f_1 setting.

Definite time delays t_1 and t_2 for the two channels are set by means of switches. Each channel is adjustable between 0.1 and 21.15s in steps of 0.05s.

It should be noted that it is possible, by use of the thumbwheel switches, to set frequencies higher than 500Hz, but beyond 500Hz the operation characteristics of the relay cannot be guaranteed.

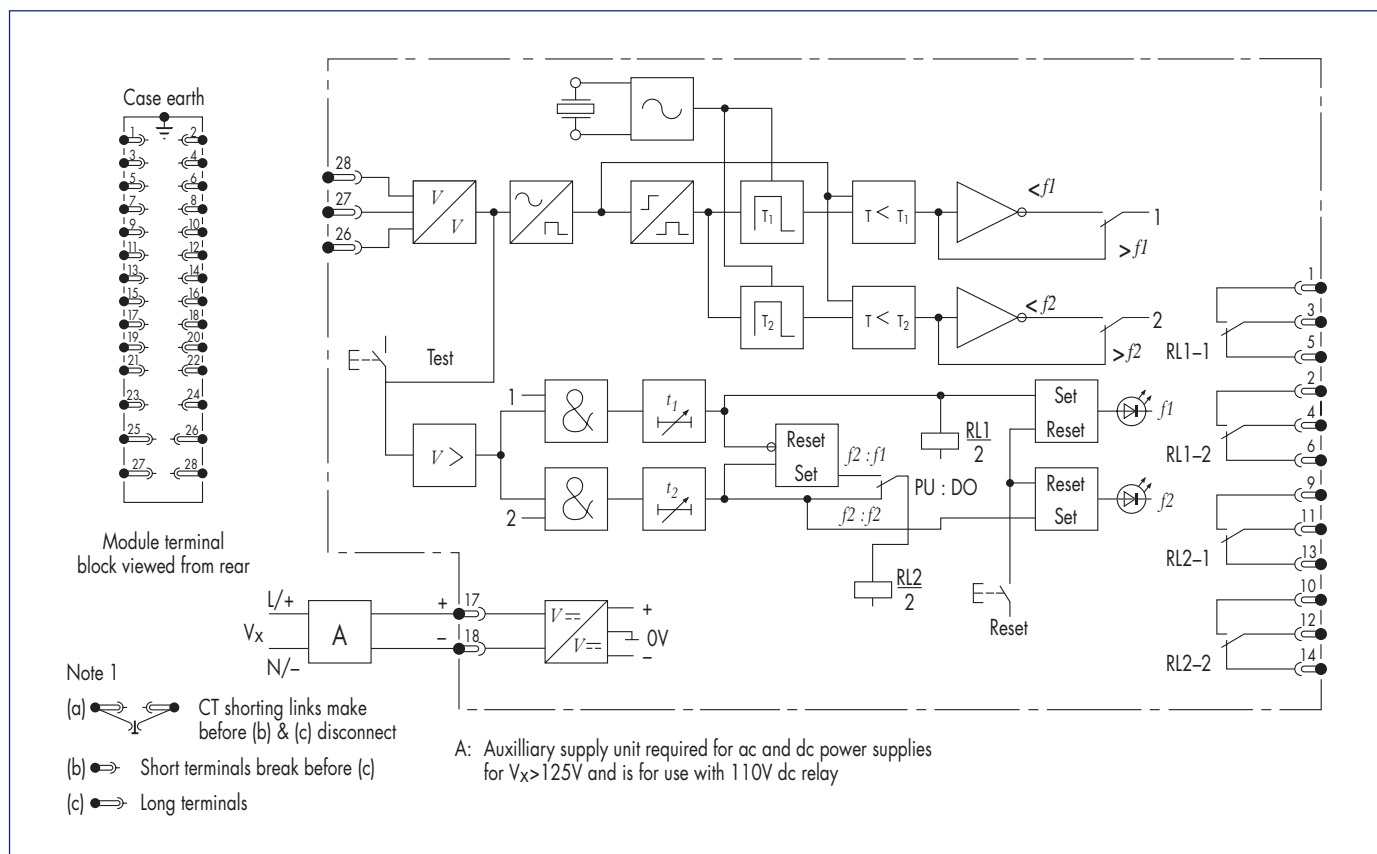


Figure 3: Type MFVU 21 relay: block diagram, dc relay

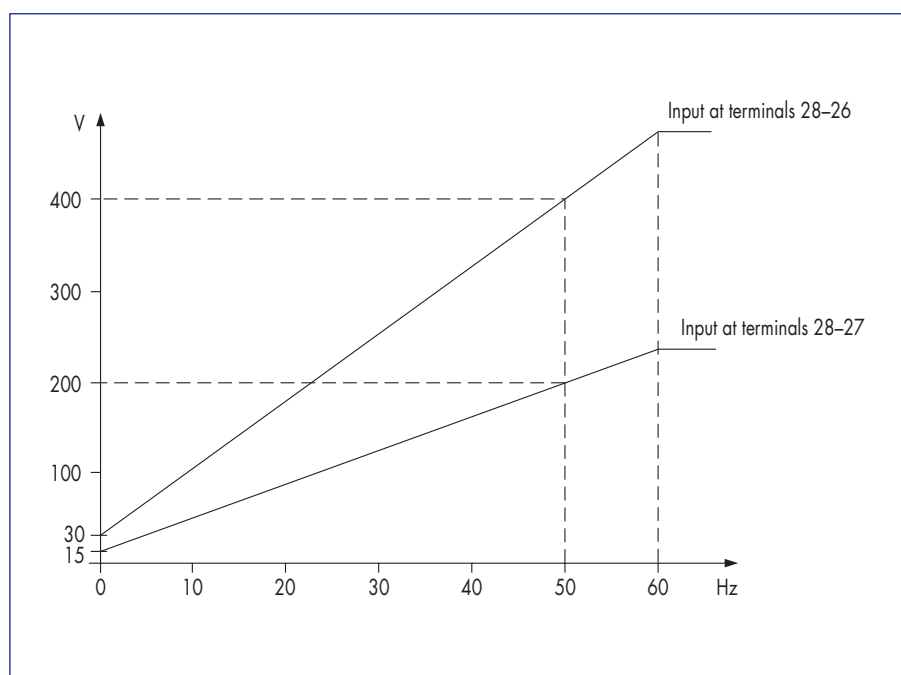


Figure 4: Maximum permissible input voltage with different terminal connections.

Technical Data

AC voltage ratings

Phase-to-phase or phase-to-neutral
See Figure 4 for maximum
admissible voltage value

Minimum operating voltage
(terminals 28-27):

10V

Minimum operating voltage
(terminals 28-26):

20V

Auxiliary voltage rating

Operating range

V_x	V_{min}	$V_{max(ac)}$	$V_{max(dc)}$	Frequency (ac version)
24	21.6	26.4	28.8	50-60Hz
30	24	33	36	50-60Hz
48	38.4	52.8	57.6	50-60Hz
110	88	121	132	50-60Hz
125	110	137.5	150	50-60Hz

V_x	V_{min}	V_{max}	Frequency
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(Uses 110V dc relay with
auxiliary power supply unit) ac

160/220	128	242	50-60Hz
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(Uses 110V dc relay with auxiliary
power supply unit) dc

160/250	128	275
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Settings

T_1 and T_2

0.09999s to 0.00200s adjustable
in steps of 0.00001s independently

$$(f_1 = \frac{1}{T_1} \text{ Hz}) \quad (f_2 = \frac{1}{T_2} \text{ Hz})$$

Contacts

2 changeover self reset - trip output f_1
2 changeover self reset - trip output f_2

Ratings

Carry continuously

5A

Make and carry for 0.5s

30A at 110V dc

Breaking capacity (10^5 operations)

0.3A at 110V dc L/R = 40ms

Burdens

Measuring circuits

1VA at 150V and 50Hz

Auxiliary supply:
relay de-energised

< 30mA (dc)
< 60mA (ac)

relay energised

As above plus 2W

Accuracy

Variation in auxiliary supply	±3%
Variation in temperature	(-25°C to +55°C) ±3%
Frequency detector	
Measuring time	50ms
Reset time	<50ms
Time measurement error of 1 cycle	<10µs
Timer	
Timing circuit errors	
Basic accuracy	±3%, not less than 20ms
Consistency	±1.5%, not less than 20ms

Thermal withstand

Terminals 28–26	450V 50Hz 5s 540V 60Hz 5s
Terminals 28–27	225V 50Hz 5s 270V 60Hz 5s

Voltage withstand

Insulation IEC 60255–5	2kV rms for 1 minute between all case terminals connected together and the case earth terminal 2kV rms for 1 minute between independent circuits including contact circuits 1kV rms for 1 minute across normally open outgoing contact pairs
High voltage impulse IEC 60255–5	Three positive and three negative impulses of 5kV peak, 1.2/50µs, 0.5J between all terminals of the same circuit (except output contacts), between independent circuits and between all terminals connected together and case earth
High frequency disturbance IEC 60255–22–1: 1988 Class III	2.5kV peak between independent circuits and between independent circuits and case earth 1.0kV peak across terminals of the same circuit (except metallic contacts)

Product safety



73/23/EEC	Compliance with European Commission Low Voltage Directive
EN 61010-1: 1993/A2: 1995 EN 60950-1: 1992/A11: 1997	Compliance is demonstrated by reference to generic safety standards

Environmental withstand

Temperature

IEC 60068-2-1/IEC 60068-2-2

Storage and transit -25°C to $+70^{\circ}\text{C}$

Operating -25°C to $+55^{\circ}\text{C}$

Humidity

IEC 60529

56 days (dust protected)

Vibration

IEC 60255-21-1

0.5g between 10Hz and 150Hz

Mechanical durability

Loaded contact

10,000 operations minimum

Unloaded contact

100,000 operations minimum

Cases

MFVU 21 relays are housed in size 4 cases (see Figure 5)

Information Required with Order

Auxiliary supply voltage ac or dc

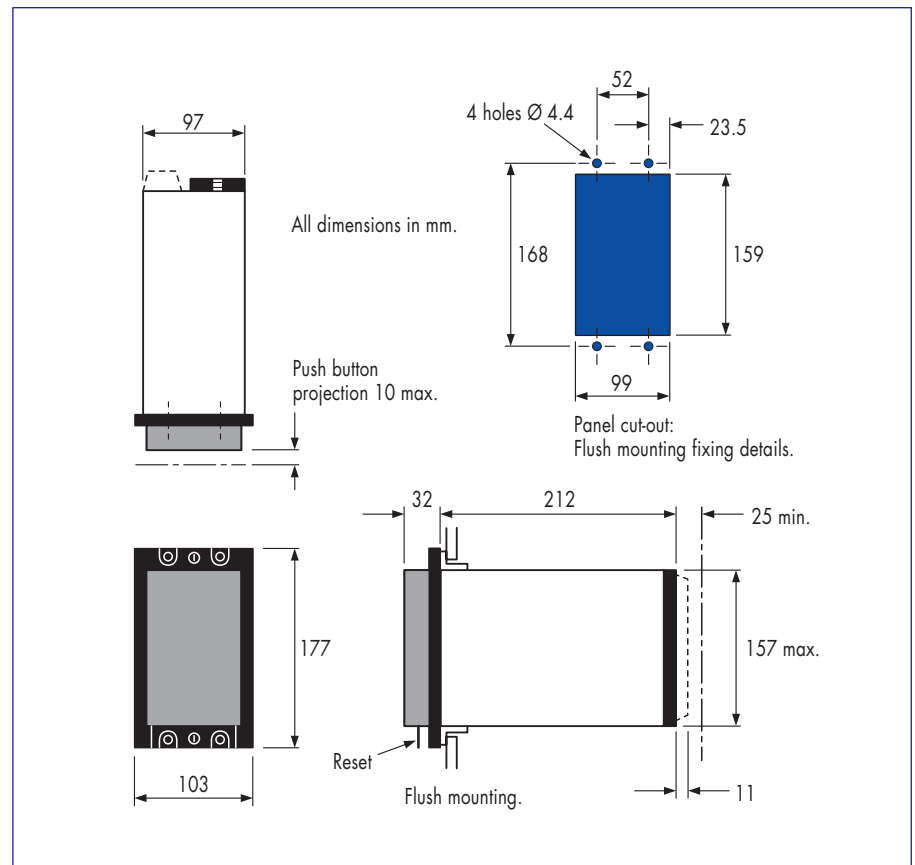


Figure 5: Case outline size 4



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